



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of :

Daisuke ITO et al.

Application S.N.: 10/528,229

Filed: March 18, 2005

For: STRONGLY STRETCHED  
ALIPHATIC POLYESTER  
MOLDINGS

Group Art Unit: 1794

Examiner: Ellen S. Wood

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Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

DECLARATION UNDER 37 CFR 1.132

I, the undersigned, Naoko HAMADA, hereby declare as follows:

1. I am a citizen of Japan and a resident of 4-14-25-3-206 Tohkohdai, Ishioka-shi, Ibaraki-ken, Japan.

2. In March 2004, I received my Master of Science degree in chemistry from Graduate School of Humanities and Sciences, Nara Women's University, Japan.

3. Since April 2004, I have been employed at Kureha Corporation (formerly, Kureha Chemical Industry Company, Limited) and have conducted research in the filed of, among others, polymer blends and evaluation of physical properties of bottles and preforms in Resin Processing Laboratory in Polymer Processing & Products Research Laboratories of Kureha Corporation.

4. I am not one of the applicants of the application S.N. 10/528,229 (hereinafter referred to as the instant application). However, I have read carefully the specification and claims which constitute the instant application. Accordingly, I am now familiar with the specification and claims of the instant application.

5. Moreover, I have read carefully and I am familiar with the Official Action dated April 17, 2008, which action rejected Claims 1 – 12 of the instant application. I have read carefully and I am familiar with the reference, Obuchi et al. (US 6,417,294), which is hereinafter referred to as Obuchi ('294). The substance of the Examiner's rejection is believed to be based on the conclusion that Claims 1 – 12 are anticipated by or, in the alternative, obvious over Obuchi ('294).

6. The invention of the instant application (hereinafter referred to as the instant invention) is based on the discovery that only intense stretching, i.e., at a large stretching ratio and at a temperature not substantially higher than a glass-transition temperature ( $T_g$ ) of a crystalline aliphatic polyester, results in the characteristic effects of the instant invention, i.e., a substantial increase in crystal melting point, main and sub-dispersion peak temperature according to dynamic viscoelasticity measurement, which lead to substantial improvements in retort-durability, gas-barrier property and impact strength. This is already believed to be clearly demonstrated for polyglycolic acid (PGA) by comparison between Examples 1 – 4 and Comparative Examples 1 – 6 in Tables 1 – 2 at page 24 of the instant application. Thus, the intense stretching effects could only be attained by stretching at a large ratio exceeding 3x3 times and at temperatures of 45 – 60°C, which are not substantially above the  $T_g$  (=38 – 40°C) but much lower than the melting point ( $T_g$  =215 – 220°C) of PGA.

In contrast thereto, Obuchi ('294) only discloses that a container was formed from a parison of polylactic acid (PLA) after heating to 120 °C and blow-expansion at ratios of twice in both the longitudinal and transverse directions in a mold maintained at 120 °C in an injection molding machine (Example 4-1 at col. 27, lines 39 – 43). These stretching conditions of 2x2 times at 120°C (compared with  $T_g$ =45 – 60°C and  $T_m$ =158 – 163°C of PLA) are clearly not intense but mild for PLA.

Obuchi ('294). refers to stretching only in relation to blow forming, among various forming methods disclosed, at col. 15, line 63 – col. 16, line 4 and Example 4-1 discussed above. At the former part, the mold temperature for the blow forming is only referred to as between  $T_g$ (59°C) and  $T_m$ (163°C). Thus, Obuchi ('294) fails to disclose intense stretching conditions as taught by the instant invention.

Consequently, Obuchi ('294) is not believed to disclose or suggest a stretched aliphatic polyester product, as in the instant invention, having a substantially increased crystal melting point and substantially increased main and sub-dispersion temperatures than those of an un-stretched product thereof, obtainable through intense stretching of a crystalline aliphatic polyester resin.

## 7. TEST EXAMPLE

In order to try to corroborate the above arguments, I have, under my direction and control, conducted the following stretching test by using polylactic acid homopolymer ("NATURE WORKS" made by Nature Works Co.;  $T_g=55-60^{\circ}\text{C}$ ,  $T_m=160^{\circ}\text{C}$  (as catalog data); and  $T_g=57^{\circ}\text{C}$ ,  $T_m=163^{\circ}\text{C}$  (as measured by me), which are comparable to  $T_g=59^{\circ}\text{C}$  and  $T_m=163^{\circ}\text{C}$  disclosed by Obuchi ('294) (col. 16, lines 1 – 2); and  $M_w$ ( PMMA(polymethyl methacrylate-based weight-average molecular weight measured by GPC (gel permeation chromatography)) =210,000 – 220,000) in parallel with PGA (showing a melt viscosity of 2500 Pa · s as measured at a temperature of  $240^{\circ}\text{C}$  and a shear rate of  $100\text{ sec}^{-1}$  used in Examples of the instant application.

More specifically, each resin was extruded through a T-die at an extrusion temperature of  $220-240^{\circ}\text{C}$  to form a cast sheet, from which a yet-unstretched sample sheet measuring 80mm x 80mm x  $100\text{ }\mu\text{m}$  (thickness) was cut out, and the sample sheet was stretched at a ratio of 2x2 times at a stretching speed of 7 m/min. (140%/sec.) at a stretching (preheating) temperature of  $120^{\circ}\text{C}$  for PLA and  $80^{\circ}\text{C}$  for PGA. As a result, the PLA sheet exhibited crystalline melting points of  $163^{\circ}\text{C}$  and  $162^{\circ}\text{C}$  before and after the stretching, respectively, and anti-impact strengths of only 39 N (Force) and 0.06 J (Energy) after the stretching. Thus, the PLA sheet failed to exhibit the intense stretching effects of the present invention, similarly as the PGA sheet stretched at a ratio of 2x2 times at  $80^{\circ}\text{C}$  which exhibited an identical crystalline melting point of  $218^{\circ}\text{C}$  both before and after the stretching and anti-impact strengths of only 6 N (Force) and 0.01 J (Energy) after the stretching.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: September 18 , 2008

Naoko Hamada

Naoko HAMADA